CLAIMS

1. A method for cleaning a semiconductor substrate with a sonic cleaner, the method comprising:

introducing a cooling fluid into an inner jacket of a sonic cleaner to cool a sonic resonator positioned within the inner jacket;

introducing a cleaning agent into an outer jacket of the sonic cleaner to clean a semiconductor substrate;

defining a cooling fluid/cleaning agent interface at an orifice located between the inner jacket and the outer jacket;

transmitting sonic energy from the resonator to the cleaning agent through the interface at the orifice; and

applying the cleaning agent to the semiconductor substrate.

2. The method of claim 1, wherein the method operation of applying the cleaning agent to the semiconductor substrate further includes:

directing the cleaning agent to impact the semiconductor substrate at an angle.

3. The method of claim 2, wherein the angle is between about 5 degrees and about 40 degrees.

4. The method of claim 1, wherein the method operation of defining a cooling fluid/cleaning agent interface at an orifice located between the inner jacket and the outer jacket further includes,

balancing a pressure of a cooling fluid in the inner jacket and the cleaning agent in the outer jacket to minimize dilution of the cleaning agent by the cooling fluid.

5. The method of claim 1, wherein the cleaning agent is heated.

6. The method of claim 1, wherein the resonator is a megasonic resonator.

7. A method for cleaning a semiconductor substrate, comprising:

defining a cooling fluid/cleaning agent interface at an orifice located between an inner jacket and an outer jacket; and

balancing a pressure exerted by a cooling fluid within the inner jacket and a pressure exerted by a cleaning agent within the outer jacket to minimize dilution of the cleaning agent by the cooling fluid.

8. The method of claim 7, further comprising:

transmitting sonic energy from a resonator to the cleaning agent through the interface at the orifice.

9. The method of claim 7, further comprising:

applying the cleaning agent to the semiconductor substrate.

10. The method of claim 7, further comprising:

directing the cleaning agent to impact the semiconductor substrate at an angle.

11. The method of claim 7, further comprising:

directing the cleaning agent to impact the semiconductor substrate at an angle between about 5 degrees and about 40 degrees.

12. The method of claim 8, further comprising:

locating the resonator within a region defined by the inner jacket.

13. The method of claim 8, further comprising:

aligning an axis of the resonator with an axis of the interface.

14. The method of claim 8, wherein the resonator is a megasonic resonator.